

SOLID STATE LASER SYSTEM FOR ULTRA VIOLET MICRO-LITHOGRAPHY - INCLUDES AN NEODYMIUM YTTRIUM ALUMINIUM GARNET LASER, TWO FREQUENCY MULTIPLICATION CRYSTALS AND A SOLID STATE OPTICAL SYSTEM

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PATENT FAMILY

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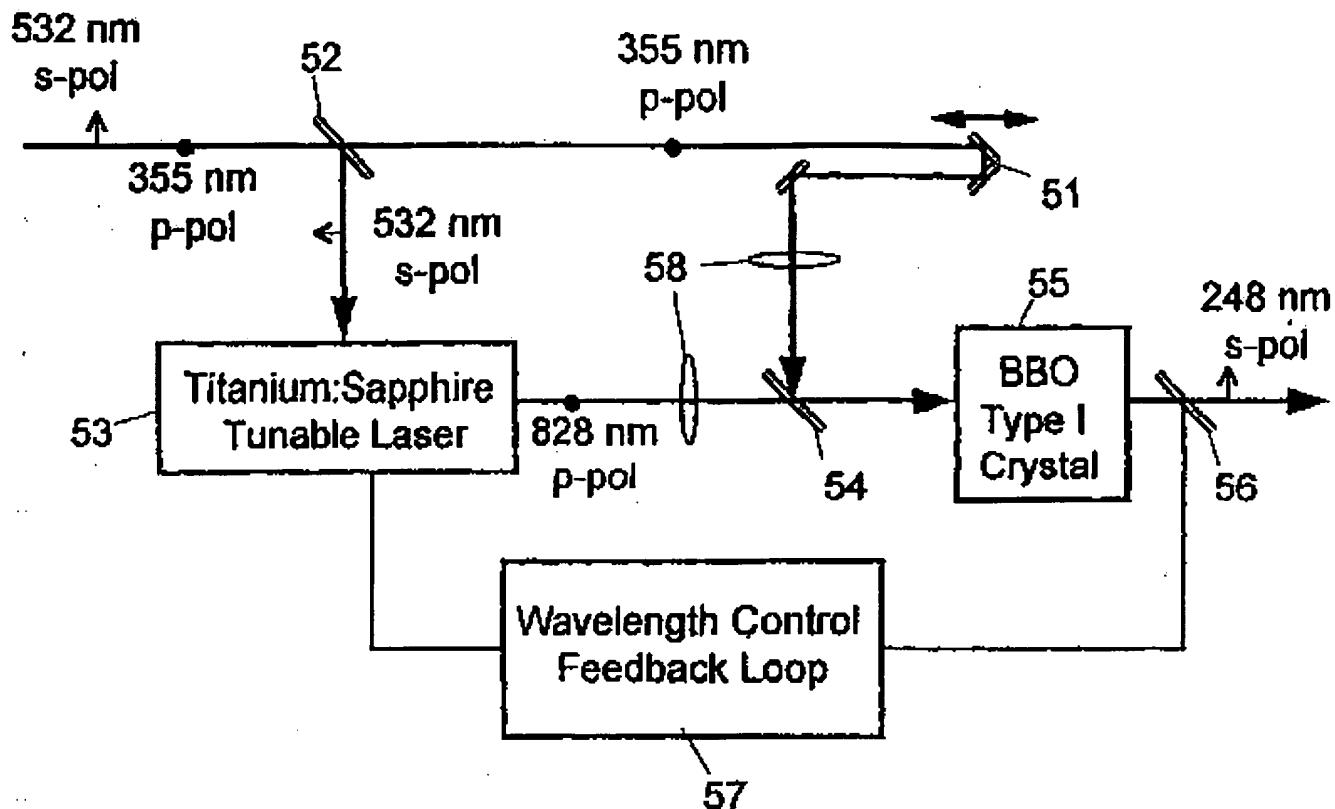
Abstract: WO 9822997 A

**(I) Solid state system for generating highly monochromatic UV laser radiation at wavelengths of 193 or 248 nm for micro-lithography comprising:** (a) a Nd:YAG laser producing a primary laser beam of narrow line width pulses of IR laser radiation at 1064 nm wavelength, lasting < 30 nsec. with a repetition rate of at least 500 pulses / sec. and a line width of 0.002 nm; (b) at least one frequency multiplication crystal shaped and arranged to generate 355 nm radiation and at least one to produce 532 nm from the 1064 nm radiation; and (c) solid state optical system for producing a 193 or 248 nm beam from the 532 or 355 nm radiation.

Also claimed (II) the system as (I) in which the laser has a pulse duration of 5 - 30 nsec. at 1000 - 5000 pulses / sec. with an energy of 20 - 200 mJoules, and the first frequency multiplication crystal is a type I LBO crystal which doubles the frequency of a portion of the 1064 nm beam to give a combined beam of p-polarised 1064 nm and s-polarised 532 nm radiation, which is converted by a second type II LBO crystal to a combined beam of p-polarised 1064 nm, s- polarised 532 nm, and p-polarised 355 nm radiation.

USE - Advanced micro-lithography for semiconductor device manufacture.

ADVANTAGE - The minimum feature size produced by pattern transfer is reduced.



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